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Urban Mass Transportation

abstracts

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UMTA ABSTRACTS SUBJECT CLASSIFICATION

01. Conventional Transportation Services
02. Center City/Traffic Restraints
03. Energy and Environment
04. Fares/Pricing and Service Innovations
05. Financing
06. Land Use
07. Non-Urban and Low-Density Area Transportation
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13. Technology Development and Deployment
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14. Transportation of Disadvantaged/Special-User Groups
15. Transportation/Transit Management
16. Transportation Productivity and Efficiency
17. Urban Goods Movement

UMTA-SPONSORED REPORTS AVAILABLE AT THE NATIONAL TECHNICAL INFORMATION SERVICE

01. CONVENTIONAL TRANSPORTATION SERVICES

An Analysis of User Cost and Service Trade-Offs in Transit and Paratransit Services. Final Report.

Louviere, J., and G. Kocur. Cambridge Systematics, Inc., under contract to Transportation Systems Center. UMTA-MA-06-0049-79-10, August 1979, 208p.

The Xenia Model Transit Service served as a test of several alternative transit services operated in a small city setting. This project was undertaken as an aid to the evaluation of transit and paratransit systems in Xenia, Ohio, and as a test of a new technique for assessing travel demand. The technique, direct utility assessment, was designed to test a new method for assessing user trade-offs in costs and services based on attitudinal methods. A trade-off survey was administered, and the data was used to develop separate equations for each sample respondent to explain their trade-offs over transit fare, travel time, walk distance, type of service, and headway. An aggregate equation was also developed. These equations were employed to retrospectively predict changes in transit system patronage (since 1974). Both sets of models performed well. Overall results were promising for policy evaluation and forecasting. This report contains a bibliography.

NTIS No. PB 80-192412 Price A10

Self-Sustaining Public Transportation Services.
Volume I: Guidelines for Implementation. Final Report.

Morlok, E.K., and P.A. Viton. University of Pennsylvania.
UMTA-PA-11-0017-80-1, November 1979, 42p (2 vols).

This research study examines three systems of urban transportation services which are self-sustaining (cover at least operating costs from the farebox), namely: 1) the Philadelphia-Lindenwold Hi-Speed Line, a rail rapid transit line operated by the Port Authority Transit Corporation (PATCO); 2) the express bus services in New York City with routes operated by both the Metropolitan Transit Authority as well as private bus companies; and 3) the suburban railroad service in the Chicago metropolitan area of the Chicago and Northwestern Transportation Company (formerly C&W Railway). These services are characterized by high fares; high service quality including a high probability of obtaining a seat and attention to consumer comfort and safety; travel times comparable to those on alternative

modes, including the private car; service between residential areas and CBDs; market areas composed primarily of middle-to-upper-income inhabitants; and costs not necessarily lower than comparable service by other operators. All three, until recently covered at least operating costs from the farebox. That two of them no longer do so is attributable to explicit policy decisions, and not to a failure in the viability of the service (See Chapter 2, Volume II . This research concludes that although self-sustaining services are clearly appropriate only for certain markets, within those markets they have potential as a means of relieving the increasing scale of transit deficits.

NTIS No. PB 80-196140 **Price A03**

Self-Sustaining Public Transportation Services.
Volume II: Technical Report. Final Report.

Morlok, E.K., and P.A. Viton. University of Pennsylvania.
UMTA-PA-11-0017-80-2, November 1979, 239p (2 vols).

This research study consists of two separate volumes. Volume I of this final report is a non-technical manual of guidelines for implementation. The guidelines are based on examination of three self-supporting, or nearly self-supporting, public transportation services. Volume II is a technical report describing in detail the methodology and derivation of the results. See also report abstract cited above (PA-11-0017-80-1).

NTIS No. PB 80-196157 **Price A11**

04. FARES/PRICING AND SERVICE INNOVATIONS

Transit Fare Prepayment Demonstrations in Austin, TX and Phoenix, AZ.
Final Report.

Bloomfield, P., and J. Crain. Crain & Associates, under contract to Transportation Systems Center. UMTA-MA-06-0049-80-1, June 1979, 306p.

This final report covers two matched demonstration projects testing transit fare prepayment (TFP) innovations in Austin, Texas, and Phoenix, Arizona. The innovations consisted of two consecutive sales of prepaid tickets and passes at discounts of 20% and 40%, accompanied by expansion of sales outlet networks and intensive advertising and promotional campaigns. The purpose of the demonstrations was to measure the impacts of these innovations on: 1) the volume and mix of sales of the various TFP instruments; 2) the transit-riding levels; and 3) the transit costs and operations. In addition, special attention was given to evaluating the relative cost-effectiveness of the special advertising and promotional campaigns conducted in both sites. The estimated costs of the Austin and Phoenix demonstrations were $81,660 and $127,800, respectively. The main effect of the demonstrations was to attract existing transit riders to TFP instruments. Other benefits associated with the demonstrations were the attraction of new riders and a slight increase in public awareness of transit. This report contains an executive summary documenting the findings. It also contains a summary and conclusions regarding both demonstrations as well as survey and interview forms and information.

NTIS No. PB 80-192818 **Price A14**

05. FINANCING

The Financing of Multijurisdictional Public Transportation Services.
Final Report.

Kidder, A.E. North Carolina A&T State University Transportation Institute. UMTA-NC-11-0008-80-1, March 1980, 73p.

This study summarizes the means of providing non-federal support for public transportation in eight cities where more than one political jurisdiction is the service area of the public transportation system. The cities studied are: Albany, New York; Gary, Indiana (and the Northern Indiana Commuter Transportation District); Miami, Florida; Norfolk, Virginia; Sacramento, California; Seattle, Washington; St. Louis, Missouri; and Washington, D.C. This report shows the extent to which funding sources are earmarked, the basis for cost-allocation formulas, the sources of public subsidies, the trends in operating deficits, and the problems inherent in welding several independent political jurisdictions into one financing arrangement. Solutions varied from consolidating taxing authority into one unit of government (Dade County) to setting a price and allowing jurisdictions to buy the level of service each wants (Norfolk). Other solutions included earmarking of already collected state taxes, of basing relative contributions on relative assessments, and pure legislative fiat in allocation of local shares. Deficits appeared to grow faster in systems with earmarked revenue sources, and all systems tended to look to higher levels of government for support.

NTIS No. PB 80-198625 **Price A04**

08. PARATRANSIT SYSTEMS AND SERVICES

An Analysis of User Cost and Service Trade-Offs in Transit and Paratransit Services.
Final Report.

Louviere, J., and G. Kocur. Cambridge Systematics, Inc., under contract to Transportation Systems Center. UMTA-MA-06-0049-79-10, August 1979, 208p.

See abstract cited earlier (p. 62, 01).

NTIS No. PB 80-192412 **Price A10**

The Innovation Process for Dial-A-Ride.
Phase I.

Rogers, E.M., K.P. Magill, and R.E. Rice. Stanford University, Institute for Communication Research. UMTA-CA-06-0115-79-1, June 1979, 295p.

The purpose of this investigation is to examine policy-relevant issues regarding the Federal role in the diffusion of urban mass transportation innovations, and to arrive at an understanding of the innovation process in organizations. This report is Phase I of a three-phase research project, and it documents the nature of the innovation process in organizations that adopted Dial-A-Ride. During Phase I, a series of ten in-depth case studies were conducted to identify the general stages of the innovation process in organizations dealing with mass transportation. Six major areas were researched in the case studies: 1) the actors involved in the innovation-decision process; 2) the primary motivating factors to adopt Dial-A-Ride; 3) the communication channels that provide information and influence in the local public organization's innovation-decision; 4) the degree to which an innovation such as Dial-A-Ride is re-invented; 5) the sequential scale with which an urban mass transportation innovation is implemented by an organization; and 6) the direct/indirect effects of UMTA-sponsored demonstrations in the innovation-decisions of potential adopters of Dial-A-Ride.

NTIS No. PB 80-185093 **Price A13**

Berkshire Regional Transit Authority:
Transportation System Management Evaluation Report.

Cook, C.W. Berkshire County Regional Planning Commission.
UMTA-MA-09-0050-80-1, October 1979, 145p.

This document summarizes the local evaluation study of the transit service provided by the Berkshire Regional Transit Authority (BRTA) in Pittsfield, Massachusetts. The purpose of the study was to review and evaluate the current transit services provided by BRTA and to develop recommendations for service modifications which utilize low cost techniques to improve operating effectiveness. Emphasis is on the three new routes in Pittsfield, the overall fare structure, and the priority locations for bus stop shelters. A loading survey was conducted and provided information on maximum loading, hourly ridership, passenger miles of travel, and average trip length by route. This report serves as an excellent example of service evaluation within a small transit system.

NTIS No. PB 80-196777 **Price A07**

Delaware River Port Authority Transit Improvement Program.
Volume I: Planning for PATCO Extension and Improvement.

Delaware River Port Authority, under contract to Delaware Valley Regional Planning Commission. UMTA-IT-09-0032-80-1, April 1978, 196p (3 vols). This report is available in microfiche copy only.

The Delaware River Port Authority (DRPA) has been engaged, since June 1970, in promoting a comprehensive Mass Transit Study which was directed toward developing specific recommendations regarding the DRPA Mass Transportation Development Program. This three-volume study contains the eleven regional transportation-related technical studies conducted by the DRPA. This report, Volume I, contains the following project reports: 1) Continuation of DRPA Transit Planning Program (I); 2) Justification of PATCO Extensions and Improvements (V); 3) Master Plan of Public Transportation Improvements for the DRPA Area of Responsibility (VI); 4) Relocation Program (VII); and 5) Advanced Land Acquisition Program (VIII). It also analyzes the Consultants Rail Expansion Program in terms of regional implementation; least cost versus acceptable levels of service; support of land-use objectives and policies; and beneficial effects of social problems of mobility, poverty, and segregation. The Consultants' program recommended a total program of 32 miles of additions to the existing rapid transit system.

NTIS No. PB 80-186174 **Price A01**

Delaware River Port Authority Transit Improvement Program.
Volume II: Environmental and Social Planning.

Delaware River Port Authority, under contract to Delaware Valley Regional Planning Commission. UMTA-IT-09-0032-80-2, April 1978, 260p (3 vols). This report is available in microfiche copy only.

This report, Volume II, contains the following project reports: 1) Environmental Impact Analysis (II); 2) Improvements for Better Serving the Elderly and Handicapped (IX); and 3) Environmental Improvements to the Existing PATCO System (X). It contains environmental evaluation information regarding the Philadelphia-Mt. Laurel Line, and the Philadelphia-Glassboro Line. The report examines methods of serving the elderly and handicapped (E&H) and high-speed rail transportation facilities operated by PATCO (Port Authority Transit Corporation); SEPTA (Southeastern Pennsylvania Transportation Authority); METRO (Washington Metropolitan Area Transit Authority); and MARTA

(Metropolitan Atlanta Rapid Transit Authority). The report also reviews the need and recommends methods for providing environmental improvements to the existing PATCO system such as noise abatement, station modification, user information services, landscaping for aesthetic improvements, and modification to existing parking facilities.

NTIS No. PB 80-186182 **Price A01**

Delaware River Port Authority Transit Improvement Program.
Volume III: Planning for Improved South Jersey Commuter Service.

Delaware River Port Authority, under contract to Delaware Valley Regional Planning Commission. UMTA-IT-09-0032-80-3, April 1978, 257p (3 vols).

This report, Volume III, contains the following project reports: 1) Ridership and Revenue Study: Woodcrest/Philadelphia International Airport Rail Commuter Service (III); 2) Ridership and Revenue Study: Woodcrest/Atlantic City Rail Commuter Service (IV); 3) Ridership and Revenue Study: Woodcrest/Ocean City/Cape May Rail Commuter Service (XI); 4) Appendix A: Statements Supporting Revision of DRPA FY 1974 Unified Work Program; and 5) Appendix B: Unified Work Program, Revised Scope of Services DRPA Projects. This report evaluates the rail commuter service in Southern New Jersey in terms of ridership, revenues, and capital and operating costs. Some systems examined herein would have utilized existing Pennsylvania-Reading Seashore Lines and Penn Central trackage and the tracks of the planned Center City-Airport High Speed Line.

NTIS No. PB 80-186190 **Price A12**

The Development of Service Standards and Operating Guidelines for the Delaware Authority for Regional Transit. Task B of the DART Planning Program.

Barton-Aschman Associates, Inc., prepared for the Wilmington Metropolitan Area Planning Coordinating Council. UMTA-IT-09-0061-80-1, November 1979, 194p.

The service standards project is one aspect of the Delaware Authority for Regional Transit (DART) planning program intended to increase DART's patronage,improve DART's operational efficiency, and increase the regional transit accessibility with the Wilmington urbanized area. The objectives of this project are the development of service standards: 1) that relate to the user; 2) that aid the transit operator; and 3) that aid the community by contributing to the quality of life in the DART service area. The study has resulted in the development of a group of proposed service standards and operating guidelines for DART which provide a firm framework for the future provision of public transportation services throughout the Wilmington metropolitan area. These standards and guidelines can be applied to the New Castle County, Delaware-Cecil County, Maryland-Salem County, and New Jersey SMSA. This report presents an introduction and background of transit performance measurement, a detailed description of the transit service standards and operating guidelines proposed for adoption by DART, and an assessment of the degree to which DART's current operations are in compliance with the suggested standards and basic planning guidelines. In addition, a preliminary estimate of the costs required to have DART's service meet these proposed standards and guidelines is included.

NTIS No. PB 80-196322 **Price A09**

12. SOCIOECONOMICS

Automated Guideway Transit Socio-Economic Program Findings 1976-1979. Final Report.

Nawrocki, R., and B. A. Zumwalt. The MITRE Corporation, Metrek Division. UMTA-IT-06-0176-80-1, February 1980, 102p.

This report summarizes initial findings from the ongoing AGT Socio-Economic Research Program of UMTA. The program addresses the operational performance, social, economic, environmental, and institutional issues associated with automated guideway transit (AGT) technology to determine where and under what conditions AGT will prove to be a feasible urban public transportation mode. The report includes: 1) a review of empirically-based assessment data on the performance, costs, and public acceptability of operational AGT systems; 2) an analysis of urban AGT feasibility concentrating on AGT ridership potential and associated costs relative to other public transportation modes; 3) an investigation of potential socioeconomic and environmental impacts of urban AGT deployment; and 4) an analysis of the nature and magnitude of the potential national market for AGT technology. The report is presented in a question and answer format in which questions highlight issues often raised regarding AGT deployment.

NTIS No. PB 80-184633 Price A06

Supplement II: Summary of Capital and Operations & Maintenance Cost Experience of Automated Guideway Transit Systems. Costs and Trends for the Period 1976-1979.

Comparato, T.F., M.E. von Rosenvinge, and D.C. Kendall. Transportation Systems Center. UMTA-MA-06-0069-80-1, March 1980, 74p.

During 1979, four of the five major AGT systems in the United States carried approximately 35 million passengers at an average operating and maintenance (O&M) cost of $0.14 per passenger. Increased efficiency as well as maturity of these systems led to an O&M cost of $0.99 per vehicle mile for 1979, approximately 10 percent lower than the 1978 figure for AGT and significantly lower than the 1978 figure of $2.48 for conventional transit. This report summarizes O&M cost experience and trends for the following AGT systems for the period 1976-1979: AIRTRANS, Sea-Tac, Tampa, Disneyworld (WEDway), and Morgantown. Capital cost data is reviewed on Morgantown Phase I, AIRTRANS, Tampa, Sea-Tac, Miami, Busch Gardens, Disneyworld, King's Dominion, and Fairlane. In addition to presenting capital and O&M costs and trends, this report includes an analysis of the factors influencing these costs. A section on the differences between urban and non-urban settings of AGT systems has also been included and shows how the costs of existing non-urban systems might relate to a system in an urban deployment in terms of site conditions and site requirements.

NTIS No. PB 80-204878 Price A04

13. TECHNOLOGY DEVELOPMENT AND DEPLOYMENT

Innovation in Public Transportation: A Directory of Research, Development and Demonstration Projects. Annual Report, FY 1979.

Transportation Systems Center. UMTA-MA-06-0086-80-2, FY 1979, 245p.

This eighth annual directory contains descriptions of current research development and demonstration (RD&D) projects sponsored and funded by UMTA of the U.S. Department of Transportation. The directory focuses on activity that took place in fiscal year 1979, and the intent of this directory is to make public information regarding UMTA's RD&D activities. All projects described herein are

funded under Sections 6, 9, and 11 of the Urban Mass Transportation Act of 1964, as amended. Section 6 programs relate mainly to technology development and deployment, service and methods demonstrations, transportation planning and management; Section 9 studies relate to local transportation (Technical Studies) and special planning studies; and Section 11 programs relate to policy development and research (including University Research and Training Grant Program). The appendixes provide information about federal research and development in urban mass transportation grants and contracts. This document also provides an index of agencies/contractors, a project index, and a subject index.

NTIS No. PB 80-204142 **Price A11**

13A. BUS AND PARATRANSIT VEHICLE TECHNOLOGY

Ramp Design Parameters for Low Floor Transit Buses.
Final Report.

Booz, Allen & Hamilton, Inc., Transportation Consulting Division.
UMTA-MD-06-0024-80-1, April 1980, 134p.

The design guidelines, developed from the program documented in this report, are the result of UMTA's concern that the best accessibility possible be achieved for handicapped riders on ramp-equipped Transbus coaches. Physically handicapped volunteers (including wheelchair-bound persons) were used to test a full-scale mock-up of a Transbus coach. These participants' physical capabilities were quantified and then various vehicle dimensional configurations were tested by simulating boarding, coach interior maneuvering, and alighting activities. Dimensional requirements for coach interior and ramp maneuvering were evaluated as well as non-quantifiable requirements such as ramp surface materials, need for handrails, and safety conditions. The study concludes that accessibility for handicapped people can be achieved with the ramped low-floor Transbus and that by using the design guidelines recommended in this report, it is possible to improve the fit between bus design constraints and the needs of the handicapped passengers.

NTIS No. PB 80-196546 **Price A07**

13C. NEW SYSTEMS AND AUTOMATION

Dual Mode Planning Case Study - Milwaukee.
Volume 1: Executive Summary and Planning.

Kocur, G., E. Ruiter, and D. Stuart. Cambridge Systematics, Inc., in association with Barton-Aschman Associates. UMTA-MA-06-0056-80-1, August 1977, 428p (3 vols).

This study analyzes the operation, economics, and impacts of dual mode transit systems in an urban case study setting in Milwaukee, Wisconsin. In this report both manual and computerized sketch planning model systems are developed to analyze dual mode systems and a parametric analysis strategy is developed. "Best values" of station spacing, guideway extent, speed, feeder area management, fare policy, etc., are discussed in this report. A brief review of dual mode implementation and institutional issues are also presented. This report describes key results of the study and only a brief summary of methodology is given.

NTIS No. PB 80-193956 **Price A19**

Dual Mode Planning Case Study - Milwaukee.
Volume 2: Technical Appendices.

Kocur, G., E. Ruiter, and D. Stuart. Cambridge Systematics, Inc., in association with Barton-Aschman Associates. UMTA-MA-06-0056-80-2, August 1977, 332p (3 vols).

This report, Volume 2, describes the methodology and background data used in this dual mode transit study. See abstract cited earlier (p. 68, 13C).

NTIS No. PB 80-189996 **Price A15**

Dual Mode Planning Case Study - Milwaukee.
Volume 3: Transit Sketch Planning Manual.

Kocur, G., E. Ruiter, and D. Stuart. Cambridge Systematics, Inc., in association with Barton-Aschman Associates. UMTA-MA-06-0056-80-3, August 1977, 162p (3 vols).

This report, Volume 3, describes the quasi-manual model used in the study, which can be used as a sketch planning model in other applications. A manual sketch planning model for transit systems is developed, using only two computer steps (UTPS program UMODEL and UROAD) in a very simple application. Capabilities to quickly model a wide range of transit technologies and operating policies are built into the model. Default cost, environmental, and demand parameters are included. In this report both manual and computerized sketch planning model systems are developed to analyze dual mode systems and a parametric analysis strategy is developed. The study finds that most transit operating policies cannot effectively utilize the no-transfer capability of dual mode vehicles and that only a very high service-level strategy can utilize that capability.

NTIS No. PB 80-193964 **Price A08**

Evacuation and Rescue in Automated Guideway Transit.
Volume 1: Data Collection, Scenarios, and Evaluation. Final Report.

Benjamin, D.E. Vought Corporation, under contract to Transportation Systems Center. UMTA-MA-06-0048-79-2, December 1979, 84p (2vols).

In order to examine specific AGT developments and concepts, UMTA has undertaken a new program of studies and technology investigations known as the Automated Guideway Transit Technology (AGTT) Program. The objective of one segment of the program, the Systems Safety and Passenger Security (SS&PS) Study, is the development of guidelines for the assurance of actual and perceived passenger safety and security in AGT systems. The evacuation and rescue task of the project has as its objective the production of a guidebook detailing the most effective methods and procedures for providing evacuation and rescue in AGT systems. Because of their unmanned nature and unique configurations, AGT systems present a number of problems related to evacuation and rescue. The purpose of this portion of the SS&PS program was to identify these problems and where possible, recommend solutions. This document, Volume 1 of the final report on evacuation and rescue in AGT, describes the methodology used in developing evacuation and rescue guidelines.

NTIS No. PB 80-195761 **Price A05**

Evacuation and Rescue in Automated Guideway Transit.
Volume 2: Guidebook. Final Report.

Benjamin, D.E. Vought Corporation, under contract to Transportation Systems Center. UMTA-MA-06-0048-79-3, December 1979, 97p (2 vols).

This Guidebook, Volume 2, provides guidelines and other information relative to evacuation and rescue of passengers from AGT systems. The report discusses problems and solutions of both conventional and AGT systems; planning requirements; and recommendations of methods for AGT evacuation and rescue.

NTIS No. PB 80-195779 **Price A05**

Factors Contributing to the Retention of Seated Passengers During Emergency Stops. Final Report.

Jacobs, H.H. Dunlap & Associates, Inc., under contract to Transportation Systems Center. UMTA-MA-06-0048-79-6, March 1980, 75p.

The objective of the Systems Safety and Passenger Security (SS&PS) segment of the AGTT is the development of guidelines for the assurance of actual and perceived passenger safety and security in AGT systems. The objective of this deceleration and jerk research study is to provide AGT system planners, designers, and operators with guideline information on the acceleration levels at which seated AGT passengers might be expected to be thrown from their seats during emergency stops. Seven experiments were conducted to examine the variables that would contribute to a safe emergency stop on an AGT system. Major results indicated that forward-facing subjects sustained higher deceleration levels without being dislodged than subjects sitting at small orientation angles of 15 and 30 degrees.

NTIS No. PB 80-195134 **Price A04**

Operation of Automated Guideway Transit Vehicles in Dynamically Reconfigured Trains and Platoons. Volume II: Part III - Systems Operations Analysis.

Shladover, S. Massachusetts Institute of Technology. UMTA-MA-06-0085-79-3, October 1979, 236p.

This is the second of a two-volume report documenting research completed in the MIT Vehicle Dynamics Laboratory in the area of dynamic entrainment and platooning of AGT vehicles. This report addresses such issues as lane capacity and merge junction performance and contains the overall conclusions of the study. The study shows that the passenger capacity of AGT systems may be significantly increased by operating vehicles in dynamically reconfigured trains or platoons. It is estimated that a minimum lane capacity of 5,000 to 10,000 passengers per hour is needed to make single-party AGT economically competitive with buses and that this capacity requires the use of trains. The "zero gap" merge scheme developed in this report produces dramatic improvements compared with conventional merge strategies. The concepts of dynamic entrainment and platooning are shown to deserve more detailed study and testing because of the significant advantages they offer. (Volume I: Part I - Applications Analysis, and Part II - Vehicle Analysis is available as NTIS order number PB 80-142862.)

NTIS No. PB 80-198856 **Price A11**

Phase I Morgantown People Mover Impact Evaluation. Final Report.

Hsiung, S., and M.D. Stearns. Transportation Systems Center. UMTA-MA-06-0026-80-1, March 1980, 154p.

This report is a multi-year evaluation of the Phase I Morgantown People Mover (MPM) system and was conducted to document the impacts of this first system of its type to be built and operated in an urban area. This system is expected to be the forerunner of significant changes in public transportation concepts. The

objective of this report is to analyze the impact of the Phase I MPM system. The report presents a summary of the system and service characteristics impacts of the system. The areas discussed include an overview of the system and the evaluation effort associated with it, a description of system performance and service characteristics, system ridership, system finances, system impacts, and an identification of experiences that are transferable to other applications of AGT. System performance improved as the system improved. Service characteristics were better than the prior University bus system. Experiences that have potential application to other AGT systems include the start-up, safety, and station design experience of the MPM system.

NTIS No. PB 80-187768 **Price A08**

Predicting Automated Guideway Transit System Station Security Requirements. Final Report.

Ray, C., et al. W.V. Rouse & Company, Division of Barton-Aschman Associates, Inc., under contract to Transportation Systems Center. UMTA-MA-06-0048-80-4, March 1980, 148p.

This study addresses the issues of personal security on AGT systems, as they might be deployed in typical urban residential and non-residential settings. Based upon a literature review, it outlines basic characteristics of existing transit crime; compares station design concepts for AGT and conventional rail transit; reviews the key environmental characteristics of AGT stations that may influence crime; inventories both existing and proposed countermeasures for transit crime reduction; identifies additional neighborhood resources which might be mobilized as countermeasures; reviews available techniques for predicting transit crime; and reviews techniques available for both predicting transit crime and assessing countermeasure effectiveness and offers recommendations for analysis strategies to be employed in local AGT studies. Traditional as well as innovative analysis techniques are discussed. This report recommends a general approach for AGT station security requirements analysis which can be used by localities in site-specific AGT planning and engineering studies. This report provides a list of references as well as an annotated bibliography.

NTIS No. PB 80-194244 **Price A07**

Simulation Models for the Electric Power Requirements in an Automated Guideway Transit System. Final Report.

Williams, G. H. Transportation Systems Center. UMTA-MA-06-0048-80-2, April 1980, 137p.

This report describes a computer simulation model developed at the Transportation Systems Center (TSC) to study the electrical power distribution characteristics of AGT systems. The objective of this simulation effort is to provide a means for determining the power distribution requirements of AGT systems and for evaluating their performances under varied operating conditions. Typical systems that could be modeled include the Morgantown Personal Rapid Transit System, the Dallas-Fort Worth AIRTRANS System, or one of the proposed Downtown People Movers. The purpose of this report is to provide the reader with a working knowledge of the multi-vehicle AGT simulation model and its application to urban transit systems. This report specifically describes a Fortran computer program that models the electric power requirements of a typical AGT system. The inputs are: 1) the vehicle propulsion system characteristics; 2) the guideway deployment; and 3) the mission profile for each vehicle. The output is

a series of tables that show voltages, power, and harmonic currents in the electric power distribution system. Also included herein is a listing of the Fortran Program and an illustrative application example to multi-vehicle AGT systems.

NTIS No. PB 80-193386 **Price A07**

Vehicle Lateral Control and Switching.
Volume I: Project Summary. Final Report.

Haines, G. A., et al. Otis Elevator Company, Transportation Technology Division. UMTA-IT-06-0156-79-1, March 1980, 143p. (7 vols).

This report summarizes the results and significant findings of the Vehicle Lateral Control and Switching (VLACS) Project. The project objectives are to investigate and improve the steering and switching capabilities of automated transit vehicles through analysis, simulation, and test of lateral control of switching systems and to develop guidelines for the development of these systems. Three types of steering systems are investigated: 1) wire-follower power-assisted steering; 2) wall-follower power-assisted steering; and 3) passive wall-follower steering. The significant findings and major conclusions from each project task are included in this report. Also summarized and included in this report are the contents of the final project reports which describe the hardware studies, the design and simulation activities, the test program, and the data base report. Recommendations for future related studies are included.

NTIS No. PB 80-199722 **Price A07**
SET (7) PB 80-199714 **Price E99**

Vehicle Lateral Control and Switching.
Volume II: Design and Analysis, Part A: Model Development. Final Report.

Fry, C.M., T. McHugh, and J. Greeson. Otis Elevator Company, Transportation Technology Division. UMTA-IT-06-0156-79-2, March 1980, 470p. (7 vols).

This report contains design and analysis results from the VLACS project of Automated Guideway Transit Technology (AGTT) Program. In this report lateral control system models are developed for wire-follower, wall-follower active, and wall-follower passive lateral control systems, including the vehicle, lateral position sensors, and actuators. Vehicle dynamic models are developed for vehicles having Ackermann steering geometry and for vehicles with wagon-wheel steering. AGT vehicle models developed include ten-degree-of-freedom models used for ride quality analysis and simpler three-degree-of-freedom models used for lateral control system design and analysis. Final lateral control system designs are presented for shuttle-loop transit, large/small group rapid transit, and personal rapid transit vehicles.

NTIS No. PB 80-199730 **Price A20**

Vehicle Lateral Control and Switching.
Volume II: Design and Analysis, Part B: VLACS Evaluations. Final Report.

Fry, C., T. McHugh, and J. Greeson. Otis Elevator Company, Transportation Technology Division. UMTA-IT-06-0156-79-3, March 1980, 528 p. (7 vols).

This report contains design and analysis results from the VLACS project.
See abstract cited above (IT-06-0156-79-2). Part A of this report contains a description of VLACS model development.

NTIS No. PB 80-199748 **Price A23**

Vehicle Lateral Control and Switching.
Volume III: Detailed Hardware Studies. Final Report.

Evans, T., et al. Otis Elevator Company, Transportation Technology Division.
UMTA-IT-06-0156-79-4, March 1980, 169p. (7 vols).

Volume III, this report, contains a description of the hardware developed for the VLACS project. The hardware for the test vehicle and for nominal vehicle designs for each of four vehicle classes (shuttle-loop transit, group rapid transit large, group rapid transit small, and personal rapid transit) is described. The test vehicle which incorporates 2 or 4 wheel Ackerman steering and 2 or 4 wheel drive is configured to implement wire and wall-follower steering systems. Test data is used for mathematical model validation and for lateral control system evaluations. Nominal vehicle designs are described that are typical of lateral control system implementations used on AGT systems. Cost and weight estimates for the typical designs are presented.

NTIS No. PB 80-199755 **Price A08**

Vehicle Lateral Control and Switching.
Volume IV: Test Program. Final Report.

Peckham, G., et al. Otis Elevator Company, Transportation Technology Division.
UMTA-IT-06-0156-79-5, March 1980, 139p. (7 vols).

In this report, major emphasis is given to the results of three alternative steering techniques using the VLACS test vehicle and simulations. Use of test data for mathematical model validation is discussed. The three types of steering systems for rubber-tired transit vehicles investigated in this report are: 1) mechanical sensing without power steering (herding); 2) mechanical sensing with power steering; and 3) electromagnetic (wire-follower) sensing.

NTIS No. PB 80-199763 **Price A07**

Vehicle Lateral Control and Switching.
Volume V: Data Base. Final Report.

Gary, M. J. Otis Elevator Company, Transportation Technology Division.
UMTA-IT-06-0156-79-6, August 1979, 135p. (7 vols).

This report is the fifth volume of the seven separate reports of the VLACS project Final Report. This volume provides a catalog of the data base material gathered and classified as part of the VLACS project. It contains 1) an annotated bibliography which includes short summaries of the documents listed, a list of descriptors, and a series of user designators, and 2) a subject index which includes numerous entries and subentries, and cross-references. The data base lists technical works dealing with vehicle lateral control, switching and steering systems, vehicle dynamics, ride quality, and other related topics. Its purpose is to help planners and designers find the material they need to evaluate and select AGT systems.

NTIS No. PB 80-199771 **Price A07**

Vehicle Lateral Control and Switching.
Volume VI: Software Manual. Final Report.

Fry, C.M., and T. McHugh. Otis Elevator Company, Transportation Technology Division. UMTA-IT-06-0156-79-7, March 1980, 323p. (7 vols).

This report contains a description of the software developed for the VLACS project of the Automated Guideway Transit Technology Program. In this report,

a description of the software developed for the study of AGT vehicle lateral control and switching systems is discussed. A simulation employing a ten-degree-of-freedom vehicle model for ride quality analysis and a simulation employing a three-degree-of-freedom vehicle model for lateral control studies are described. Also included is a description of the VLACS switching system analysis program.

NTIS No. PB 80-199789 **Price A14**

13D. RAPID RAIL VEHICLES AND SYSTEMS

U.S. Transit Track Assessment and Research Needs.
Final Report.

Cunney, E.G., P.L. Boyd, and J.A. Woods (London Transport International, Ltd.). ENSCO, Inc., under contract to Transportation Systems Center.

UMTA-MA-06-0100-79-16, December 1979, 211p.

The overall objective of this study is to help expand and systematize the current search for improvements in transit track. The study aims to identify new technology and research tasks that increase the performance, reliability, and safety of urban rapid transit systems, and to ensure that track research provides maximum benefits to the transit industry. Track problems and practices were investigated at transit properties in the U.S., and technology was studied in the transit industries in both the U.S. and Europe. This report describes track conditions; current practices in track design, construction, maintenance, and inspection; potential opportunities for improvements; favorable technology that is available but not commonly used in transit track systems; and research and support tasks to fill identified needs. This report also describes the evaluation of research and support tasks, the analysis of their costs and benefits, and a recommended implementation plan for a track research program.

NTIS No. PB 80-196892 **Price A10**

13F. LIGHT RAIL VEHICLES AND SYSTEMS

A Report on Light Rail Transit: Surface Operations.
Seminar Proceedings. Final Report.

Transportation Research Board (TRB), National Academy of Sciences.

UMTA-DC-06-0216-80-1, April 1980, 31p.

There is growing recognition that technology is not the stumbling block to light rail transit (LRT) development and implementation. Instead, the principal cause appears to be a deep-seated concern among decision-makers over the basic feature of LRT--surface operation. Influential groups manifest this concern and have questioned the desirability of surface rail operations. This report recognizes that the high costs of segregated fixed-guideway transit have dampened LRT's popularity. As a result, TRB and UMTA decided to conduct an examination of the obstacles to lower-cost surface configurations. Toward this end, a by-invitation-only seminar was convened in Washington, D. C., on December 5-6, 1978. Its objective was to trace specific problems and to propose where effort toward their solution should be most effectively directed. This report contains three bacground papers as well as the summary of discussions on the impact of alignment options, traffic-engineering requirements, safety requirements for installation and operation requirements for passenger stop locations, intermodal interface, fare-collection options for surface operation, and future actions.

NTIS No. PB 80-197700 **Price A03**

13G. CONSTRUCTION/TUNNELING TECHNOLOGY

Effects of Tunnel and Station Size on the Costs and Service of Subway Transit Systems. Final Report.

Dayman, B., Jr. California Institute of Technology, Jet Propulsion Laboratory.
UMTA-CA-06-0116-79-2, April 1979, 55p.

This study was initiated to determine the feasibility of less spacious, hence less costly underground rail mass transit system designs that would meet a wide range of requirements - namely, the savings that could be obtained by designing systems having smaller tunnels and stations, and the effects on service of such less pretentious system designs. Two elements considered herein are tunnels and stations. Tunnel cost data were generated specifically for this study to examine the effects of tunnel diameter on costs in a favorable geology, like the Los Angeles basin. Other cost estimates and actual bid costs were used to develop a realistic cost model that included the cost of electrical energy as a function of tunnel diameter. Existing cost estimates for underground stations with platforms were combined with the capital costs and operations of trains to develop a cost model for stations. Several approaches for decreasing electrical energy are included with brief comments. The major cost saving expected from alternative tunnel designs (up to $6M per route mi.) results from using pre-cast concrete segment liners instead of steel. The savings expected for a two-foot decrease in the diameter of twin, single-track tunnels is about $2M per route mi. from $13M for pre-cast concrete segment liners (16 percent saving). The cost per route-mile of a double-track tunnel appears to be 15-25 percent higher than for the twin, single-track tunnels. The cost saving expected from stations with 4-car trains instead of the usual 8-car trains is one-fourth or $7M per station. The saving in station cost can be obtained while improving service to the user up to 36,000 riders per hour in each direction.

NTIS No. N80-19989 Price A04

Field Evaluation of Advanced Methods of Subsurface Exploration for Transit Tunneling. Final Report.

Thompson, D.*, J. Humphrey*, L. Young**, and F. Wall**. *Haley & Aldrich, Inc., and **Bechtel Incorporated, under contract to Transportation Systems Center.
UMTA-MA-06-0100-80-1, June 1980, 405p.

This report presents the results of a field evaluation of advanced methods of subsurface exploration on an ongoing urban rapid transit tunneling project. The objective herein is to evaluate, through a field demonstration project, the feasibility, applicability, reliability, and cost effectiveness of selected advanced methods of subsurface exploration and instrumentation to produce data usable for rapid transit tunnel design and construction within the time, cost, and schedule constraints common to the industry. Numerous methods of subsurface exploration, including hole advancement techniques, sampling procedures, and geophysical logging tools, were used to predict stratigraphy within a test section on an urban rapid transit project under construction. A test section on the Massachusetts Bay Transportation Authority Red Line Extension-Northwest, Cambridge, Massachusetts, was selected to evaluate methods of subsurface exploration used to investigate stratigraphy, ground water levels, bedrock structure, and other geotechnical parameters. Exploration methods are evaluated in terms of adaptability to urban environment, technical performance in test section conditions, and costs. This report contains a bibliography, rock core photographs/analysis, geologic profiles, and subsurface summary sheets.

NTIS No. PB 80-200496 Price A18

13G. CONSTRUCTION/TUNNELING TECHNOLOGY

Low-Cost Bus-Tunnels to the Central Business District.
Final Report.

Dayman, B., Jr. California Institute of Technology, Jet Propulsion Laboratory.
UMTA-CA-06-0116-79-1, March 1979, 61p.

An important aspect of the bus-tunnels proposed in this study is the practicality of converting the bus tunnel to a subway system. The objectives of this study were 1) to determine if small diameter, unventialated, hence inexpensive tunnels could be used for bus links between the Central Business District (CBD) and outlying areas; 2) to estimate the cost of bus-tunnels; and 3) to indicate the basic features of an underground station and to make a rough cost estimate. Tunnels selected were 16 1/2 ft. inside diameter (same as a single-track tunnel conventionally used for recently constructed U.S. subway rail systems). For a one route-mile bus-tunnel, 150 diesel buses per hour were acceptable; for a two route-mile tunnel, 54 buses were acceptable. The costs of such an underground guideway are moderate ($16M per route-mile with simultaneous operations in both directions). The incorporation of an underground station at the CBD end of the bus-tunnel, and the ventilation requirements for a typical station are also examined. The cost estimate for the station is in the range of $26-39M. Based upon service, operations, and costs, this report states that the use of small diameter, unventilated tunnels for bringing diesel buses into the CBD appears attractive and should be considered.

NTIS No. N80-19990 **Price A04**

15. TRANSPORTATION/TRANSIT MANAGEMENT

The Behavioral Impacts of Flexible Working Hours.
Final Report.

Ott, M., H. Slavin, and D. Ward. Transportation Systems Center.
UMTA-MA-06-0049-79-12, February 1980, 31p.

This paper presents new results on the behavioral responses to flexitime--a system of flexible working hours that permits workers to select their daily schedules within certain pre-defined limits. This study is based on a flexitime experiment conducted at the U.S. Department of Transportation's Transportation Systems Center (TSC) in Cambridge, Massachusetts. TSC is a large government facility that employs more than 600 persons and is located in a dense and congested area of the Boston region, but has high accessibility to all urban transit modes. This study was designed to permit a rigorous assessment of individuals' activity and travel responses and their implications for transport planning. Preliminary econometric models indicated that work scheduling responses to flexitime were strongly influenced by socioeconomic/life cycle characteristics, travel time savings, and activity patterns. Approximately 9 percent of workers changed modes in response to flexitime. A majority of workers experienced travel time savings and fuel savings (5 percent for vehicles driven to work) due to flexitime. The findings in this report suggest that flexitime may be an important strategy for reducing energy consumption.

NTIS No. PB 80-191174 **Price**

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